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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference P26796PC00/HSE FOR FURTHER | | | FOR FURTHER A | | Notification of Transmittal of International minary Examination Report (Form PCT/IPEA/416) | |
|--|--|-------------|----------------------------|--------------------------------------|--|---|
| | | | | International filing date 17.07.2003 | (day/month/year) | Priority date (day/month/year) 26.07.2002 |
| International Patent Classification (IPC) or both national classification and IPC H02H3/12 | | | | | | |
| Applicant SPAARSTEKKER B.V. et al. | | | | | | |
| 1. | This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36. | | | | | |
| 2. | 2. This REPORT consists of a total of 5 sheets, including this cover sheet. | | | | t. | |
| | This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). | | | | taining rectifications made before this Authority | |
| | Thes | se anr | exes consist of a total of | of 8 sheets. | | |
| 3. | 3. This report contains indications relating to the following items: | | | | | |
| | I | \boxtimes | Basis of the opinion | | | |
| | [] | | Priority | | | |
| | 111 | | Non-establishment of | opinion with regard to n | ovelty, inventiv | e step and industrial applicability |
| | IV | | Lack of unity of invent | ion | | |
| | V | \boxtimes | | under Rule 66.2(a)(ii) wi | | ovelty, inventive step or industrial applicability; |
| | VI Certain documents cited | | | | | |
| | VII | | Certain defects in the | international applicatior | 1 | |
| | VIII | | Certain observations of | on the international appl | ication | |
| | | | | | | |
| Date of submission of the demand | | | | Date of comple | etion of this report | |
| 09.02.2004 | | | | 01.10.2004 | | |
| Name and mailing address of the international preliminary examining authority: | | | | al | Authorized Off | icer |
| European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | | | 56 epmu d | Wilhelm, G Telephone No. | +49 89 2399-2749 | |

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/NL 03/00528

| i_ | Basis | of the | report |
|------------|-------|--------|--------|
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1. With regard to the **elements** of the international application (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)):

| | De | scription, Pages | • | |
|--------------------------|--------------|---|---|--|
| 2-26 as originally filed | | | | |
| | 1 | | filed with telefax on 25.08.2004 | |
| | Cla | ims, Numbers | | |
| | 1-3 | 3 | filed with telefax on 25.08.2004 | |
| | Dra | wings, Sheets | | |
| | 1/3- | -3/3 | as originally filed | |
| 2. | Wit lanç | h regard to the langu guage in which the in | lage, all the elements marked above were available or furnished to this Authority in the ternational application was filed, unless otherwise indicated under this item. | |
| | The | ese elements were av | ailable or furnished to this Authority in the following language: , which is: | |
| | | the language of a tra | anslation furnished for the purposes of the international search (under Rule 23.1(b)). | |
| | | | lication of the international application (under Rule 48.3(b)). | |
| | | the language of a tra Rule 55.2 and/or 55. | anslation furnished for the purposes of international preliminary examination (under 3). | |
| 3. | Witl inte | n regard to any nucle rnational preliminary | eotide and/or amino acid sequence disclosed in the international application, the examination was carried out on the basis of the sequence listing: | |
| | | contained in the inte | rnational application in written form. | |
| | | filed together with th | e international application in computer readable form. | |
| | | furnished subsequer | ntly to this Authority in written form. | |
| | | furnished subsequer | ntly to this Authority in computer readable form. | |
| | | The statement that t in the international a | he subsequently furnished written sequence listing does not go beyond the disclosure pplication as filed has been furnished. | |
| | | The statement that t listing has been furn | he information recorded in computer readable form is identical to the written sequence ished. | |
| 4. | The | amendments have re | esulted in the cancellation of: | |
| | | the description, | pages: | |
| | | the claims, | Nos.: | |
| | | the drawings, | sheets: | |
| | | | | |

4.

INTERNATIONAL PRELIMINARY **EXAMINATION REPORT**

International application No.

PCT/NL 03/00528

| 5. 🗆 | This report has been established as if (some of) the amendments had not been made, been considered to go beyond the disclosure as filed (Rule 70.2(c)). | since they | nave |
|------|---|------------|------|
|------|---|------------|------|

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

No:

Yes: Claims

5-17,19-21,28-33

Inventive step (IS)

Yes: Claims

Claims

5,6,28,29

1-4,18, 22-27

Claims No:

1-4,7-27,30-33

Industrial applicability (IA)

Yes: Claims

1-33

Claims No:

2. Citations and explanations

see separate sheet

INTERNATIONAL PRELIMINARY International application International Internation International Internation Internat

1. In the written opinion an objection was raised that the wording of originally filed claim 1 is so broad and general that it can also be read onto a **switched mode power supply** (SMPS).

In detail, one known type of control of known step-down or buck converters is the **discontinuous current control mode**, i.e. dependent on the current consumption by a load, whereby the current passes from the mains via a switching element and a coil to the load. The output voltage and the load current are measured to determine the switch on/off-times of the switching transistor which is equivalent to bringing **or** holding the switching element into **or** in the open **or** closed state based on said criterion.

Note, the criterion mentioned in features c) - e) of claim 1 is not defined. Such SMPSs also serve the purpose of reducing the overall energy consumption of an electrical consumer as stated in the application on page 2, lines 35/36.

1.1 The applicant states in his letter of reply, dated 25.08.04, that a SMPS provides electrical power to the load at any time. Said electrical power is alternatingly provided from an external power supply and an internal power supply, whereby an intermediate circuit serves as an energy buffer.

The switching unit according to the present invention, however, switches between supplying electrical power and not supplying power from an external power supply.

The applicant amended the corresponding feature in claim 1, lines 9-12, which now reads as follows (the features added by the applicant with the aim to overcome the examiner's objection are underlined):

a switching element for producing a substantially conductive electrical connection between the mains port and the load port in its closed state <u>for supplying electrical power to the load</u> and substantially breaking the said electrical connection in its open state <u>for interrupting electrical power supply to the load</u>.

- 1.2 Said step-down or buck converters, however, do not have any intermediate circuit for storing energy at an intermediate voltage. The switching element of these converters is controlled such that it switches between supplying electrical power and not supplying power from an external power supply to the load.
- 1.3 Hence, independent claims 1 and 22 do not fulfil the requirement of novelty.
- 1.4 Similarly, the subject-matters of dependent claims 2-4, 18, 23-27 are defined so broadly that the features of said step-down converter can be read onto these

INTERNATIONAL PRELIMINARY **EXAMINATION REPORT - SEPARATE SHEET**

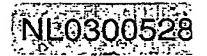
claims.

Therefore, these claims also lack novelty, at least they are not based on the exercise of an inventive step.

The applicant did not restrict the claims such that by the addition of structural 2. features and corresponding steps the switching unit and method according to the invention is novel and implies an inventive step with regard to the above discussed SMPSs, in particular step-down converters driven in the discontinuous current control mode.

The subject-matter of claim 5 (and/or claim 6) and corresponding claim 28 (and/or claim 29) is considered to be novel and inventive.

The features of remaining dependent claims 7-17, 19, 21 and 30-33 are considered to represent merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed. These claims, hence, do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.



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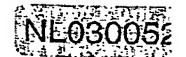
5 The invention relates to a switching unit for switching a connection between a mains and a load, comprising a mains port for electrically connecting the switching unit to the mains, a load port for electrically connecting the switching unit to the load, a switching element for producing a substantially conductive electrical connection between the mains port and the load port in its closed state and substantially breaking the said electrical connection in its open state, and current measuring means for measuring a consumption current consumed by the load.

furthermore, the invention relates to a method for switching a connection between a load and a mains, the load being connected to the mains via a switching element for the purpose of producing a substantially conductive electrical connection between the load of the said the mains in a closed state of the switching element and it is substantially breaking the said electrical connection in tan open state of the switching element.

The invention also relates to an electrical appliance comprising a switching unit of this type/and to the use of a switching unit of this type/and to the use of a switching unit of this type/.

Electrical appliances having a no-load state, such as appliances with a mains adapter which are provided with current via the mains adapter or appliances which have a standby function, are known. Examples of such appliances include notebooks, personal computers, battery chargers, halogen lighting, audio and video equipment, electric blankets, printers and other computer peripherals, as well as many other devices. The appliances may be provided with a separate mains adapter for converting a mains voltage from, for example, a grid mains into, for example, a low voltage. It is also possible for the appliances to be provided with an inbuilt power supply and for the appliance to have a standby state in which the appliance is in the no-load state.

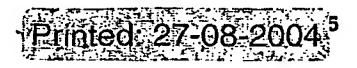
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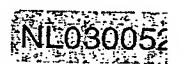


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- 1. Switching unit for switching a connection between a mains and a load, comprising:
- 5 a mains port for electrically connecting the switching unit to the mains,
- a load port for electrically connecting the switching unit to the
- a switching element for producing a substantially conductive electrical connection between the mains port and the load port in its closed state and substantially breaking the said electrical connection in its open state, and
 - current measuring means for measuring a consumption current consumed by the load, characterized in that the switching unit comprises control means which are connected to the switching element, the control means comprising:
 - (a) means for at least temporarily bringing the switching slepent into its closed state;
- which is the means for measuring a consumption current consumed by the which is the switching that it is the switching th
 - (c) means for checking the measurement on the basis of tar measurement of the criterion;
 - (d) means for bringing or holding the switching element into or in the open state if the measurement does not satisfy the criterion; and
 - (e) means for bringing or holding the switching element into or in the closed state if the measurement does satisfy the criterion.
 - 2. Switching unit according to claim 1, characterized in that the means mentioned under (c) comprise means for comparing the measured value of the consumption current with a threshold value, and
 - 35 the means mentioned under (e) comprise means for closing the switching element or holding it in the closed state if the measured value of the consumption current is greater than or equal to the threshold value.





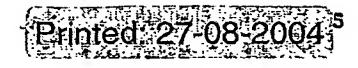
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Switching unit according to claim 1, characterized in that the means mentioned under (c) comprise means for comparing the measured value of the consumption current with a threshold value, and

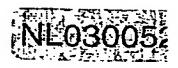
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- the means mentioned under (d) comprise means for bringing the switching element into the open state if the measured value of the consumption current is lower than the threshold value.
- Switching unit according to claim 2 or 3, characterized in that the threshold value comprises a value for a no-load - consumption current.
- Switching unit according to claim 4, characterized in that the control means also comprise:
- 15 means for using the current measuring means to measure a consumption current for a load which has been brought into a noload state, and means for storing the measured value of the consumption current as a no-load consumption current in a memory which is accessible to the switching unit.
- Switching unit according to claim 5, characterized in that with according The control means comprise means for adding a margin value to the control means for adding a margin value to the control means comprise means for adding a margin value to the control means comprise means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for adding a margin value to the control means for a different value to the control means for adding a margin value to the control means for a different value value value to the control means for a different value for the no-load consumption current.
 - of : claims. 1-6, Switching unit according to 25 one characterized in that the switching unit comprises voltage measuring means for measuring a mains voltage applied to the mains port, in that the switching element comprises a self extinguishing semiconductor switch, and in that the control means comprise control pulse generation means for generating a control 30 pulse for the self extinguishing semiconductor switch as a function of an instantaneous value of the mains voltage measured by the voltage measuring means.
 - Switching unit according to claim 7, characterized in that 35 the control pulse generation means are also designed to generate a repeating pulse train, a repetition frequency of which corresponds to double a repetition frequency of the mains



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voltage, for the purpose of holding the self extinguishing semiconductor switch in the closed state.

- 9. Switching unit according to claim 8, characterized in that the control pulse generation means are also designed to shorten a pulse duration of the control pulses after the end of a turn-on time starting from the switching element reaching: the closed state.
- 10. 10. Switching unit according to one of claims 7-9, characterized in that the control pulse generation means are designed to generate a control pulse in the open state of the switching element just before a zero crossing of the mains voltage, for the purpose of bringing the switching element into a closed state during a measurement time.
- characterized in that the control means comprise a first and a second supply voltage terminal for creating a supply voltage reminals at the control means, the first supply control was voltage terminal being connected to a terminal of the switching supply voltage terminal being connected to a terminal of the second and supply voltage terminal being connected to a terminal of the switching element which is connected to the load port.
 - 12. Switching unit according to claim 11, characterized in that the switching element comprises a voltage drop element for causing a voltage drop across the switching element in operation when the switching element is in the closed state.
 - 13. Switching unit according to one of the preceding claims, characterized in that the switching unit comprises a male plug connector unit for electrically connecting the mains port to a mains wall socket unit, and a female plug connector for electrically connecting the load port to a male plug connector which is connected to the load.

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- Switching unit according to one of the preceding claims, 11_ characterized in that the switching unit is accommodated in the load.
- Switching unit according to one of the preceding claims, the switching unit characterized that comprises in communications port for transmitting data from or to the control means.
- Switching unit according to claim 15, characterized in that 16. the communications port comprises a wireless connection.
- Switching unit according to claim 15 or 16, characterized in that the communications port comprises a terminal for connecting the switching unit to a data-processing system. 15
 - 47. Electrical appliance comprising a switching unit according to one of claims 1-17. [for supplying electrical power to the load] [[for interrupting electrical power supply to the boad]
- 19. Method for switching a connection between a load and a mains, the load being connected to the mains via as switching the with the purpose of producing an electrical connection of the between the load and the mains in a closed state of the switching element and substantially breaking the said electrical connection in an open state of the switching element, characterized by the steps of:
 - (a) at least temporarily bringing the switching element into the closed state;
 - measuring a consumption current consumed by the load in the at least temporarily closed state of the switching element;
 - checking the measurement against a criterion;
 - bringing or holding the switching element into or in the. (d) open state if the measurement does not satisfy the criterion; and
 - bringing or holding the switching element into or in the closed state if the measurement does satisfy the criterion. 35
 - 23 Method according to claim 19, characterized in that, if the 28. switching element is in the open state, step (c) comprises the step of



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comparing the measured value of the consumption current with a threshold value; and

step (e) comprises the step of

closing the switching element or holding the switching element in the closed state if the measured value of the consumption current is greater than or equal to the threshold value.

24
Ex. Method according to claim &, characterized by repeating
steps (a), (b), (c) and (d) if the measured value of the
consumption current is lower than the threshold value.

Method according to claim AA, characterized in that, if the switching element is in the closed state, step (c) comprises the step of

- comparing the measured value of the consumption current with a threshold value; and step (d) comprises the step of bringing the switching element into the open state if the measured value of the consumption current is lower than the consumption current is lowe
- 26
 27. Method according to claim 27. characterized by repeating steps (b), (c) and (e) if the measured value of the consumption current is greater than or equal to the threshold value for one 25 or more of a predetermined number of repetitions, the switching element being moved into the open state if the measured value of the consumption current is lower than the threshold value for the predetermined number of repetitions.
 - 27-26 : 30 24. Method according to one of claims 20-24, characterized in that the threshold value comprises a value of a no-load consumption current.
 - 28
 49. Method according to claim 24, characterized in that the
 35 method comprises the initial steps of:
 - (f) bringing the load into a no-load state;
 - (g) bringing the switching element into the closed state;
 - (h) measuring the consumption current;

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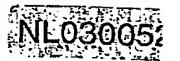
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- (i) storing the measured value of the consumption current as a no-load consumption current in a memory which is accessible to the switching unit.
- 28
 5 28. Method according to claim 28, characterized in that step
 (i) also comprises the step of:
 adding a margin value to the value of the no-load consumption current.
- Method according to claim 44, characterized in that the method also comprises the steps of:

 comparing the measured value of the consumption current with the value for the no-load consumption current;

 storing the measured value of the consumption current as a no-load consumption current in a memory which is accessible to the switching unit if the measured value of the consumption current is lower than the no-load consumption current.
- 20 that the method also comprises the steps of:

 comparing the measured value of the consumption current with a maximum value; and opening the switching clement if the measured value of the consumption current is greater than the maximum value.
 - 23-31
 23-31
 23-31
 24. Method according to one of claims 20-29, characterized in that step (b) takes place with a repetition period which is an integer multiple of a repetition period of the mains voltage.
 - 23-32
 30 29. Method according to one of claims 20-30, characterized in that the steps (a) and (b) comprise the steps of:
 repeatedly or continuously measuring an instantaneous value for the mains voltage;
 closing the switching element between two successive zero crossings of the mains voltage;
 measuring the consumption current; and opening the switching element.



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- Here of the Switching unit according to one of claims 1-17 to providing a supply voltage to and/or interrupting a supply voltage for a load at at least one predetermined time.
- #3. For of the Switching unit according to one of claims 1-17 for providing a supply voltage to and/or/interrupting a supply voltage for a load in response to an external signal.

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